88.22; western Gulf, 87.72; lower lakes, 87.22; upper lakes, 86.30; Ohio valley and Tennessee, 89.69; upper Mississippi valley, 82.44; Missouri valley, 72.80; north Pacific, 92.00; middle Pacific, 81.03; south Pacific, 96.30.

There were one hundred and thirty-seven omissions to predict out of 3,690, or 3.71 per cent. Of the 3,553 predictions that have been made, one hundred and eighteen, or 3.32 per cent., are considered to have entirely failed; one hundred and thirteen, or 3.18 per cent., were one-fourth verified; four hundred and thirty-five, or 12.24 per cent. were one-half verified; two hundred and seventy-seven, or 7.80 per cent., were three-fourths verified; 2,610, or 73.46 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During November, 1883, two hundred and forty-one cautionary signals were displayed. Of these, two hundred and three, or 84.2 per cent., were justified by winds of twenty-five miles, or more, per hour, at or within one hundred miles of the station. Fifty-two cautionary off-shore signals were displayed, all of which were justified as to velocity, and fifty or 96.2 were justified both as to direction and velocity. There were no "northwest" signals ordered on the lakes during the month. Two hundred and ninety-three signals of all kinds were displayed, of which two hundred and fifty-three, or 86.4 per cent., were fully justified. These do not include signals ordered at display stations where the velocity is only estimated. Twenty-one signals were ordered late.

Forty winds of twenty-five miles, or more, per hour were reported, for which no signals were ordered.

TEMPERATURE OF WATER.

Temperature of Water for November, 1883.

STATION.	Temperature at bottom. Max.	Temperature at bottom. Min.	Range.	Average depth, feet and inches. ft.	Average depth, feet and inches. in.	Mean temperature of the air at station.
	°	°	°			°
Atlantic City, New Jersey	55.6	41.6	14.0	7	4	45.9
Alpena, Michigan	47.6	31.0	16.6	11	10	33.6
Augusta, Georgia	67.5	53.0	14.5	5	8	57.4
Baltimore, Maryland	57.0	45.0	12.0	9	0	48.2
Block Island, Rhode Island	53.1	43.2	9.9	8	5	46.0
Boston, Massachusetts	49.6	40.0	9.6	22	2	42.5
Buffalo, New York	49.6	35.0	14.6	10	2	43.5
Cedar Keys, Florida	79.9	55.9	24.0	11	8	65.8
Charleston, South Carolina	68.3	55.9	12.4	41	6	59.4
Chicago, Illinois	48.3	34.3	14.0	8	1	41.5
Chincoteague, Virginia	60.0	43.2	16.8	5	5	49.1
Cleveland, Ohio	50.0	37.6	12.4	14	0	43.0
Detroit, Michigan	47.0	30.0	17.0	21	11	43.8
Delaware Breakwater, Delaware	56.0	45.3	10.7	8	10	48.3
Duluth, Minnesota	45.7	35.3	10.4	15	7	29.7
Eastport, Maine	47.7	44.2	3.5	15	11	38.8
Escanaba, Michigan	45.8	34.5	11.3	15	4	32.6
Fort Macon, North Carolina	66.5	51.0	15.5	3	7	55.6
Galveston, Texas	74.0	52.3	21.7	11	0	65.0
Grand Haven, Michigan	46.8	32.3	14.5	19	0	40.8
Indianola, Texas	77.1	53.8	23.3	8	6	66.3
Jacksonville, Florida	74.8	62.0	12.8	18	0	63.3
Key West, Florida	80.4	73.0	7.4	17	7	75.0
Mackinaw City, Michigan	47.6	31.8	15.8	10	0	35.6
Marquette, Michigan	42.7	35.0	7.7	9	10	32.4
Milwaukee, Wisconsin	46.5	34.0	12.5	8	0	38.3
Mobile, Alabama	71.0	58.0	13.0	14	9	60.5
New Haven, Connecticut*	50.9	39.5	11.4	13	9	42.1
New London, Connecticut						
New York City	53.5	44.7	8.8	16	4	45.0
Norfolk, Virginia	60.5	50.0	10.5	17	3	53.7
Pensacola, Florida	71.2	56.7	14.5	16	8	61.5
Portland, Maine	47.0	41.5	5.5	16	6	42.0
Portland, Oregon	49.6	45.5	4.1	55	11	46.5
Provincetown, Massachusetts	51.0	43.1	7.9	12	8	43.7
Sandusky, Ohio	48.5	32.5	16.0	9	9	44.1
Sandy Hook, New Jersey	56.0	43.5	12.5	1	6	46.0
San Francisco, California	57.2	52.2	5.0	39	9	53.5
Savannah, Georgia	66.7	57.3	9.4	11	9	59.6
Smithville, North Carolina	66.4	53.2	13.2	10	0	55.8
Toledo, Ohio	48.2	32.4	15.8	11	0	44.2
Wilmington, North Carolina	63.0	51.0	12.0	21	8	57.0

* No observations from 1st to 8th, inclusive.

The temperature of water, as observed in rivers and harbors at the Signal Service stations, during November, 1883, with the average depth at which the obervations were made, are given in the table below. The highest water temperature observed during November, 80°.4, occurred at Key West, Florida, on the 1st; the lowest, 31°, occurred at Alpena, Michigan, on the 30th. The largest monthly ranges are: Galveston, Texas, 21°.7; Indianola, Texas, 23°.3; Cedar Keys, Florida, 24°. The smallest monthly ranges are: Eastport, Maine, 3°.5; Portland, Oregon, 4°.1; San Francisco, California, 5°; Portland, Maine, 5°.5.

ATMOSPHERIC ELECTRICITY.

AURORAS.

On the night of the 1st an auroral display was observed from Minnesota eastward to New England, and on the following night a display was observed throughout the northern portions of the United States. The latter display was observed as far southward, on the Atlantic coast, as Portsmouth and Fort Macon, North Carolina; over the central portions of the country it was not reported by stations farther southward than central Illinois; and west of the ninety-second meridian it was observed only at the more northerly stations.

The following reports, relating to the several displays of the month, have been received:

Eastport, Maine, 1st.—A faint auroral light was observed from 8 to 11 p. m.

Portland, Maine, 1st.—A faint aurora was observed from 8.30 to 9.25 p. m.

Boston, Massachusetts, 1st.—An auroral light of bluish-green color, extending over about 20° of the northern sky, was observed from 2.30 a. m. until daylight.

New Haven, Connecticut, 1st.—A dim auroral light was seen in the northern sky at 11 p. m.

Barnegat City, New Jersey, 1st.—A brilliant aurora was observed from 8.35 to 10.05 p. m. When first seen it consisted of a diffuse light of pale yellow color; at 9 p. m. luminous beams rose to an altitude of 25°, gradually fading and reappearing. The whole display was of varying brilliancy, the color at times being very bright.

Escanaba, Michigan, 1st.—A diffuse auroral light appeared at 7 p. m., and continued until 10 p. m., when the whole sky became covered with clouds, and a narrow band of yellowish light extended almost entirely around the horizon at an altitude of 4°, the band varying in width from one to one and one-half degrees.

Duluth, Minnesota, 1st.—From 8.30 to 9.45 p. m. a faint auroral light, with occasional streamers, was observed.

Dubuque, Iowa, 1st.—A bright white auroral light, over a bank of cloud, was observed in the northern sky from 7.10 to 11.30 p. m.

Other stations reporting the display of the 1st, are: Southington, Connecticut; Logansport, Indiana; Moorestown, New Jersey; Northfield, Minnesota.

Eastport, Maine, 2d.—An auroral arch was visible from 9 p. m. until the early morning of the 3d.

Point Judith, Rhode Island, 2d.—At 6 p. m. a faint auroral light appeared in the northern sky; at 8 p. m. a low arch formed, extending from northwest to northeast; at 8.15 p. m. beams of bright yellow color shot upward to an altitude of 30°. The display ended during the early morning of the 3d.

Captain H. R. Hughes, of the s. s. "Alene," reports having observed a brilliant aurora when off Barnegat, on the 2d.

Atlantic City, New Jersey, 2d.—At 6.30 p. m. an auroral arch extended over about 50° of the northern horizon; a few minutes later a band of light, 4° in width, rose from the top of the arch to an altitude of 40°. The display ended at 10.30 p. m.

Portsmouth, North Carolina, 2d.—A faint aurora was seen here from 8.20 to 9.15 p. m., consisting of a dull straw-colored arch.

Oswego, New York, 2d.—An auroral display began at 8 p. m. and was obscured by clouds at 10 p. m. It consisted of beams of light, of various colors, reaching a height of 45°.

Cleveland, Ohio, 2d.—A steady auroral light and an imperfect arch were visible from 7 p. m. until the morning of the 3d.

Escanaba, Michigan, 2d.—An aurora of variable brilliancy was observed from 6.30 to 9.15 p. m. Occasional beams appeared in the northeastern sky, converging to a point near the zenith.

Saint Vincent, Minnesota, 2d.—Auroral beams were visible during the early evening, but were soon obscured by clouds.

Springfield, Illinois, 2d.—At 8.30 p. m. a faint aurora was observed consisting of a diffuse rose colored light.

Fort Shaw, Montana, 2d.—A faint aurora was visible from 8 p. m. until the morning of the 3d.

Lewiston, Idaho, 2d.—An aurora was seen here from 8.10 to 10.30 p. m., extending over about 40° of the northern horizon.

Dayton, Washington territory, 2d.—A pale green auroral light, resembling the morning twilight, was visible from 6.45 to 11 p. m.

Port Angeles, Washington Territory, 2d.—A faint aurora, resembling the morning dawn, was visible in the northern sky from 6 to 9.30 p. m.

Other auroral displays were reported on the various dates as follows:

3d.—Mount Washington, New Hampshire; New Haven, Connecticut; Milwaukee, Wisconsin; Dubuque, Iowa; Fort Totten, Dakota; La Crosse, Wisconsin.

6th.—Marquette, Michigan; Duluth, Minnesota.

13th and 18th.—Boston, Massachusetts.

19th.—Block Island, Rhode Island; Oswego, New York.

21st.—Saint Vincent and Moorhead, Minnesota; Fort Totten, Dakota.

22d.—Boston, Massachusetts; Kitty Hawk, North Carolina; Marquette, Michigan; Milwaukee, Wisconsin; Saint Vincent, Minnesota; Fort Bennett and Yankton, Dakota.

27th.—Milwaukee, Wisconsin.

29th.—Logansport, Indiana.

30th.—Mount Washington, New Hampshire.

ATMOSPHERIC ELECTRICITY INTERRUPTING TELEGRAPHIC COMMUNICATION.

Leavenworth, Kansas.—The telegraph wires were affected by atmospheric electricity at this place, and at points eastward, on the 21st.

Portsmouth, North Carolina, 2d.—The working of the telegraph line was slightly disturbed at 8.30 p. m. of this date, being probably due to the influence of the aurora which was visible at that time.

THUNDER-STORMS.

Thunder-storms were reported in the various states and territories on the following dates:

Alabama.—22d, 26th.
Arkansas.—5th, 9th, 10th, 19th, 20th, 21st, 25th, 26th.
Colorado.—4th.
Florida.—26th.
Illinois.—4th, 5th, 7th to 10th, 20th, 21st, 22d, 25th, 26th.
Indiana.—5th, 8th, 9th, 20th, 21st, 25th, 26th.
Indian Territory.—21st.
Iowa.—4th, 5th, 8th, 9th, 20th, 21st, 24th, 25th.
Kansas.—4th, 5th, 8th, 21st, 25th.
Kentucky.—21st, 25th, 26th.
Louisiana.—21st, 26th.
Maine.—30th.
Michigan.—5th, 8th, 9th, 11th, 20th, 21st, 25th, 26th.
Minnesota.—5th, 25th.
Mississippi.—21st, 22d, 24th, 25th.
Missouri.—5th, 7th, 8th, 9th, 20th, 21st, 25th.
Nebraska.—4th, 5th, 8th, 25th.
New Hampshire.—9th.
New Jersey.—10th, 30th.
New York.—9th, 11th, 21st, 22d.
Ohio.—8th, 9th, 20th, 21st, 22d.
Pennsylvania.—9th, 21st.
Rhode Island.—1st.
Tennessee.—5th, 8th, 9th, 20th, 21st, 22d, 25th.
Texas.—7th to 10th, 18th, 19th, 21st, 22d, 24th, 25th, 26th.
Utah.—23d.
Vermont.—9th, 12th.
Washington.—24th.
Wisconsin.—4th, 5th, 7th, 8th, 9th, 20th, 21st, 25th, 26th, 29th.
Wyoming.—3d.

At Cambridge, Lamoille county, Vermont, during the storm of the 12th, a barn was struck by lightning and burned, resulting in a loss of $8,000.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various states and territories on the following dates:

Arkansas.—2d, 7th, 8th, 9th, 19th, 20th.
California.—1st, 2d, 4th, 5th, 15th, 16th, 20th, 21st, 27th, 28th.
Dakota.—4th, 7th, 8th, 9th, 19th, 21st, 25th.
Florida.—3d, 22d.
Illinois.—7th, 9th, 13th, 19th, 27th, 28th, 29th.
Indiana,—26th, 27th, 28th.
Iowa.—3d, 8th, 19th, 29th.
Kansas.—8th, 13th, 24th to 27th, 29th.
Kentucky.—11th, 27th, 28th, 29th.
Maine.—10th.
Massachusetts.—2d, 6th, 8th, 13th, 15th, 17th, 20th, 22d.
Michigan.—14th, 22d.
Minnesota.—26th, 27th.
Mississippi.—2d, 16th, 19th.
Montana.—25th.
Nebraska.—11th.
New Hampshire.—20th.
New Jersey.—21st.
New York.—29th.
North Carolina.—4th, 9th, 18th, 30th.
Ohio.—5th, 7th, 12th, 13th, 29th.
Tennessee.—5th, 7th, 10th, 15th, 19th, 23d, 26th.
Texas.—15th.
Utah.—4th to 7th, 17th, 18th.
Vermont.—19th, 22d.
Virginia.—15th, 24th.
Wisconsin.—2d, 14th, 26th, 27th.

LUNAR HALOS.

Lunar halos have been observed in the various states and territories on the following dates:

Alabama.—8th, 9th, 10th, 13th, 15th, 17th.
Arizona.—5th.
Arkansas.—4th, 6th, 8th, 10th, 12th, 13th.
California.—6th, 8th, 17th.
Colorado.—8th, 10th, 21st, 22d.
Dakota.—5th, 7th, 8th, 9th, 13th, 17th, 19th, 21st, 25th.
District of Columbia.—7th.
Florida.—8th to 12th, 14th to 17th.
Georgia.—5th, 8th, 10th, 11th, 13th, 19th.
Idaho.—12th, 16th, 17th.
Illinois.—2d, 8th, 9th, 10th, 19th, 29th.
Indiana.—5th, 8th, 10th, 11th, 12th, 16th, 18th, 20th.
Iowa.—7th, 8th, 12th, 14th, 18th.
Kansas.—6th, 7th, 8th, 13th, 18th, 19th.
Kentucky.—11th, 20th.
Louisiana.—16th.
Maine.—5th, 13th.
Massachusetts.—8th, 20th.
Michigan.—3d, 8th, 9th, 13th, 14th, 18th, 20th.
Minnesota.—5th, 6th, 7th, 9th, 10th.
Missouri.—8th, 10th, 14th.
Montana.—14th, 15th.
Nebraska.—1st, 6th, 8th.
Nevada.—5th.